AD-A195 367 INSTALLATION RESTORATION PROGRAM PHASE 1 RECORDS SEARCH 1/1
FOR THE 190TH AIR..(U) HAZARDOUS MATERIALS TECHNICAL
CENTER ROCKVILLE MD JUN 86 DLA900-82-C-4426

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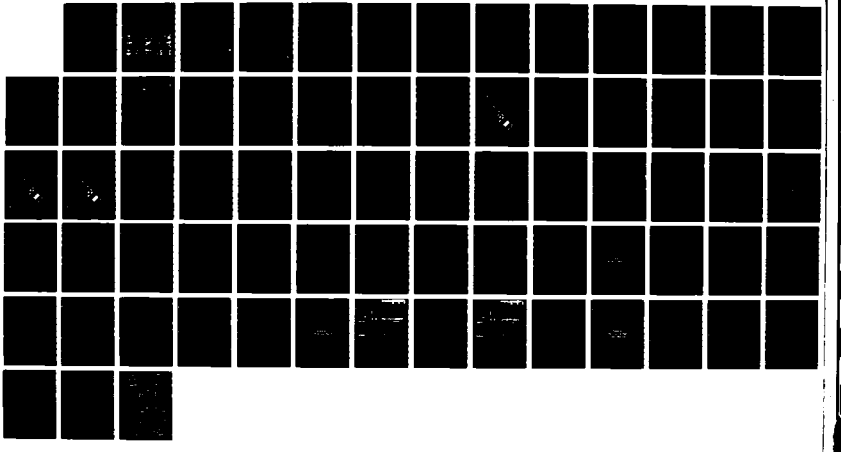

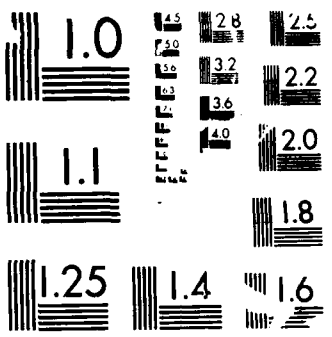

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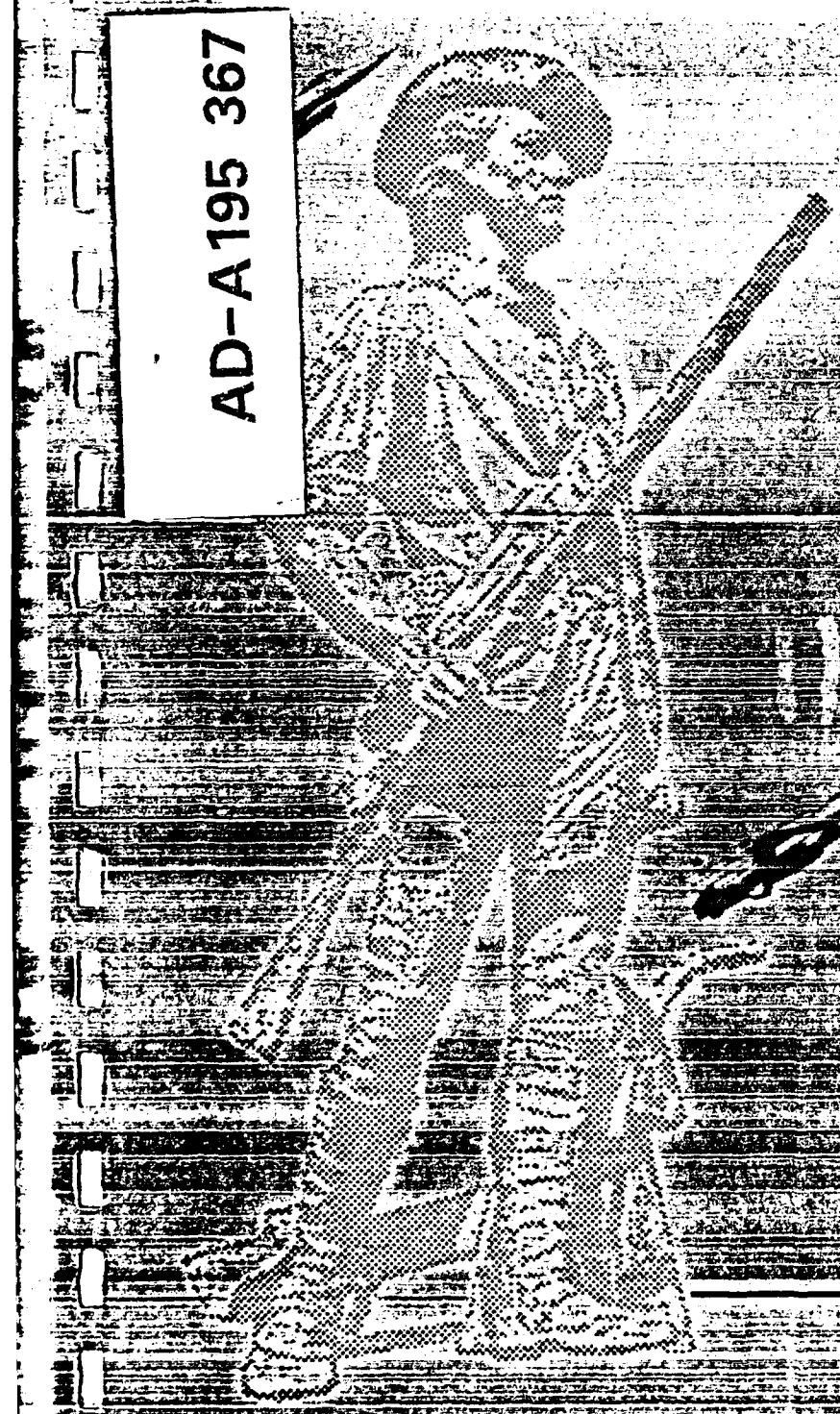
INSTALLATION RESTORATION PROGRAM

Phase I
Records Search



190th Air Refueling Group
Forbes Field ANG Base
Topeka, Kansas

Hazardous Materials Technical Center
June 1986

This report has been prepared for the Kansas Air National Guard by the Hazardous Materials Technical Center for the purpose of aiding in the implementation of the Air Force Installation Restoration Program.

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INSTALLATION RESTORATION PROGRAM
PHASE I - RECORDS SEARCH FOR
190th AIR REFUELING GROUP
FORBES FIELD AIR NATIONAL GUARD BASE
TOPEKA, KANSAS

June 1986

Prepared for:

Air National Guard Support Center
Andrews Air Force Base, Maryland 20331-6008

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Contract No. DLA 900-82-C-4426

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EXECUTIVE SUMMARY

A. INTRODUCTION

- The Hazardous Materials Technical Center (HMTC) was retained in December 1985 to conduct the Installation Restoration Program (IRP) Phase I Records Search of the 190th Air Refueling Group (AREFG), Forbes Field Air National Guard Base (ANGB) Topeka, Kansas, under Contract No. DLA 900-82-C-4426.

- The Records Search included a detailed review of pertinent installation records and an onsite visit conducted by HMTC on December 9, 10, and 11, 1985. Activities during the onsite base visit included interviews with eight base employees, a site survey, and a search of base records.

B. MAJOR FINDINGS

- The major operations of the 190th AREFG that have used and disposed of hazardous materials/wastes include aircraft maintenance; ground vehicle maintenance; petroleum, oil, and lubricant (POL) management and distribution; and fire department training. These operations involve such activities as corrosion control, nondestructive inspection (NDI), fuel cell maintenance, engine maintenance, and pneudraulics. Varying quantities of waste oils, recovered fuels, and spent cleaners, strippers, and solvents are generated and disposed of by these activities.

- The hazardous waste materials generated by these operations have been disposed of by the Defense Reutilization and Marketing Office (DRMO) and by burning at the Fire Training Area (FTA).

- Interviews with eight base personnel and a field survey resulted in the identification of 10 potentially contaminated disposal and/or spill sites at Forbes Field ANGB. Six of the 10 sites were evaluated and prioritized using the Air Force's Hazard Assessment Rating Methodology (HARM).

- Before the Phase I Records Search, a groundwater contamination study was conducted at Forbes Field ANGB by Roy F. Weston, Inc. (WESTON). This study confirmed soil and groundwater contamination at Sites Nos. 7, 8, and 9, where leaks had occurred at fuel distribution hydrants.

- Sampling by the 190th AREFG Bioenvironmental Engineering Technician before the Phase I study showed evidence of minor surface water contamination at Site No. 6, the drainage ditch (see Appendix D).

- One of WESTON's deep monitoring wells confirmed the presence of oil and grease in the groundwater upgradient of any suspected sites at Forbes Field ANGB.

C. CONCLUSIONS

- Confirmation of oil and grease contamination in the soil was made in the WESTON report. The contamination was confirmed near the center of the base property, and appears to confirm contamination in the area of Sites Nos. 5 (area adjacent to pumphouse Facility No. 671), 7, 8, and 9.

- Concentrations of oil and grease in excess of the taste and odor threshold were found in nine of 12 groundwater monitoring wells sampled by WESTON. The three wells that exhibited levels of oil and grease below the detection limit are located hydrogeologically upgradient of the disposal/spill sites.

- The presence of oil and grease in WESTON's deep monitoring well DW-1, which is located upgradient of suspected source areas on the base, indicates the potential that contaminants are migrating onto the base from other areas.

- Contaminants migrating from base facilities in groundwater travel laterally toward the tributary to Shungunuga Creek that flows along the western boundaries of the base.

- Any major POL spill that entered the storm drainage system or surface drainage ditch would be difficult to contain, since there is no mechanism in place for stemming the flow of water offbase via the drainage ditch.

- Further site investigations will be required in order to fully characterize the contamination at Forbes Field ANGB.

- The groundwater at Forbes Field ANGB is susceptible to surface contamination because of moderately permeable soils and the shallow water table.

- No evidence of offbase environmental stress resulting from past hazardous waste spills or disposal activities was observed in the immediate vicinity of Forbes Field ANGB.

D. RECOMMENDATIONS

Because of the potential for contaminant migration at Forbes Field ANGB, initial stages of the Phase II/IVA IRP are recommended for Sites Nos. 1 (area adjacent to JP-4 Storage Facility No. 55122), 5, 6, 7, 8, and 9. The primary purposes for investigating the proposed locations are:

- To determine which pollutants are present at each site or determine that no pollutants are present; and

- To determine whether groundwater at each site has been contaminated, and if it has, give quantification with respect to contaminant concentrations, the boundary of the contaminant plume, and the rate of migration.

It is also recommended that a mechanism be installed in the surface drainage ditch near the base boundary, for the purpose of stemming drainage flow in the event that a large POL spill enters the ditch.

I. INTRODUCTION

A. Background

The 190th Air Refueling Group (AREFG) is located at Forbes Field Air National Guard Base (ANGB), Topeka, Kansas. Forbes Field has been active since 1942, and over the years the types of military aircraft based and serviced there have varied. Both past and present operations have involved the use and disposal of hazardous materials. Fuel storage and handling facilities in support of base flight missions are of very large volume and represent a potential source of contamination of the environment should inadvertent releases occur. Because of the use and disposal of hazardous materials the Air National Guard (ANG) has implemented its Installation Restoration Program (IRP). The IRP is a four-phase program as follows:

Phase I - Records Search (Installation Assessment) to identify and prioritize past disposal sites posing a potential and/or actual hazard to public health health or the environment.

Phase II/IVA - Site Characterization/Remedial Action Plan to define and quantify the presence or absence of contamination that may have an adverse impact on public health or the environment via field studies, to develop a Remedial Action Plan (RAP), and prepare designs and specifications.

Phase III - Technology Base Development (if needed) to develop new technology for accomplishment of remediation.

Phase IVB - Remedial Action.

B. Purpose

The purpose of this program is to search for, identify, and assess actual or potential contaminant migration at Forbes Field ANGB by reviewing available records and interviewing base personnel who have a knowledge of present and past operations.

C. Scope

The scope of this Phase I-Records Search is limited to the ANG property of the 190th AREFG based at Forbes Field, Topeka, Kansas. Thus far, the following actions have been taken:

- o Onsite base visit,
- o Interviews of personnel from the 190th AREFG,
- o Review and analysis of all information obtained, and
- o Preparation of recommendations for further action.

The onsite visit took place on December 9, 10, and 11, 1985. The following personnel were assigned to the team and provided input to this report:

Mr. Timothy Gardner, Environmental Scientist
Mr. Robert Paquette, Environmental Scientist
Mr. Mark Johnson, Geologist

Resumes of the team members appear in Appendix E.

Individuals from the ANG who assisted in the Phase I-Records Search include Mr. Arthur Lee, Environmental Engineer, ANGSC/DEV; Lt. Col. Michael Washeleski, Bioenvironmental Engineer, ANGSC/SGB; and selected members of the 190th AREFG. The point of contact at Forbes Field ANGB was Capt. Joseph Mihalik, Assistant Base Civil Engineer.

D. Methodology

Figure 1 is a flowchart of the IRP Phase I-Records Search methodology. The team identified 10 potentially contaminated locations at Forbes Field ANGB where hazardous materials were used, disposed of, or inadvertently released to the environment.

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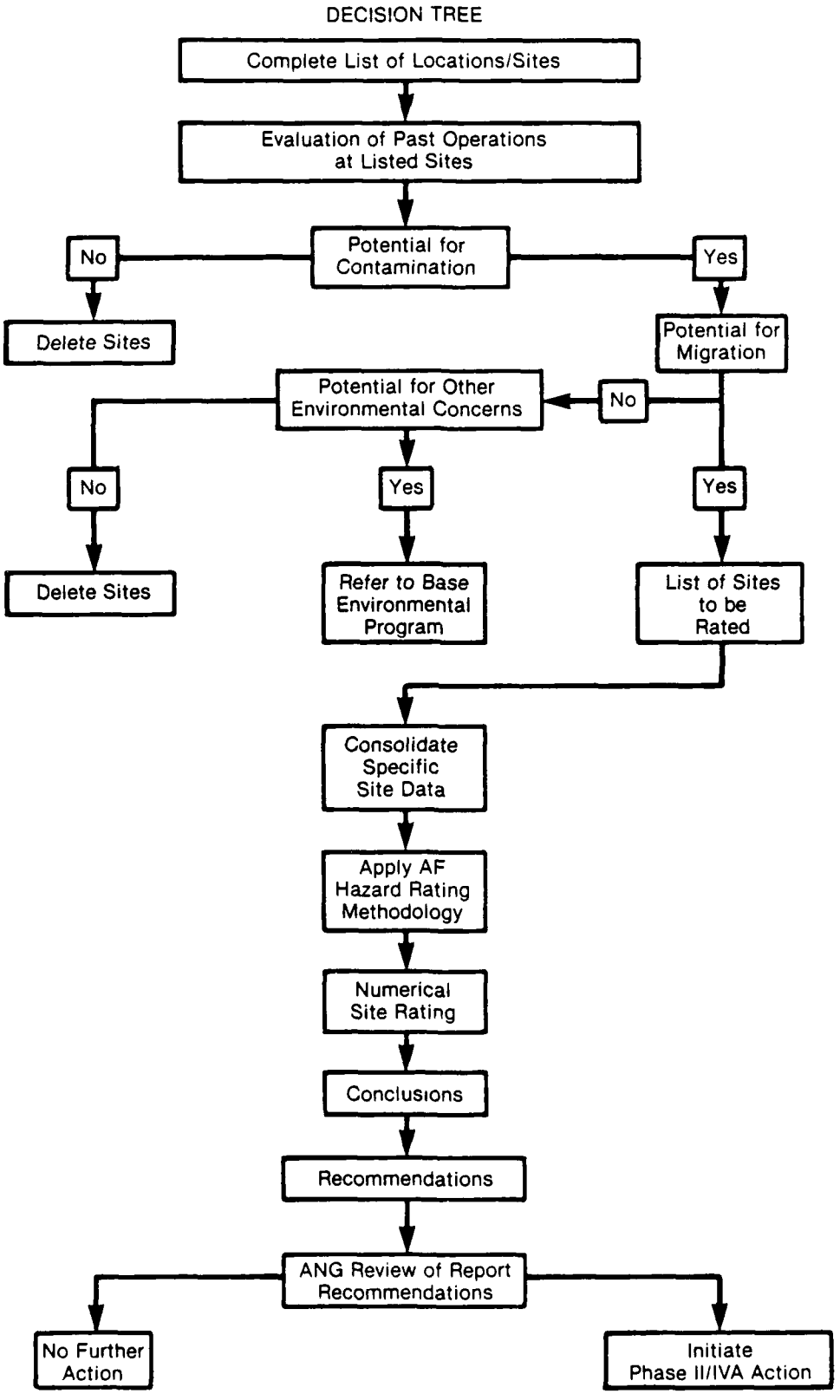
PHASE I
INSTALLATION
RESTORATION PROGRAM

Figure 1.
Records Search Methodology Flow Chart.



The team evaluated past and present operating procedures at the identified potentially contaminated hazardous waste disposal/spill sites to determine whether environmental contamination may have occurred. This evaluation was facilitated by extensive interviews with eight base employees familiar with the various operating areas of the base. Appendix A lists their principal areas of knowledge and their years of experience at the installation.

Base blueprints and records were reviewed to supplement information obtained from the interviews. In addition, the team toured the identified sites to determine the presence of visible contamination and to assess the potential for contaminant migration. Particular attention was given to locating nearby drainage ditches or surface water bodies. After compiling the necessary environmental information, six of the 10 identified sites were numerically rated using the Air Force Hazardous Assessment Rating Methodology (HARM).

II. INSTALLATION DESCRIPTION

A. Location

The 190th AREFG is located at Forbes Field, on U.S. Highway 75, approximately 4 miles south of Topeka, in Shawnee County, Kansas. The 190th AREFG occupies the northwest corner of the former Forbes Field Air Force Base, which was closed in 1973. Figure 2 displays the area studied for this Phase I report.

B. Organization and History

Forbes Field was opened in 1942 as the Topeka Army Air Corps Base. The base mission at that time was to provide operational training of heavy bombardment crews. At the end of World War II the base was closed and the hangars were used for grain storage.

During the period from 1948 to 1949, the base was reopened for use by reconnaissance and geodetic survey wings of the Army Air Corps. The base was renamed the Forbes Air Base during that time.

Forbes Air Base was reopened in 1951 with a mission of training bomber crews. In 1954, Forbes Air Base and all existing facilities were transferred to the U.S. Air Force, and the installation was officially designated Forbes Field Air Force Base. The installation was assigned to the Strategic Air Command (SAC) until July 1965, when it was transferred to the Tactical Air Command (TAC) 12th Air Force and 838th Air Division.

Forbes Field Air Force Base was closed in 1973, at which time the Kansas Air National Guard 190th Air Refueling Group was the only remaining activity at the base, located on the northwest corner of the property.

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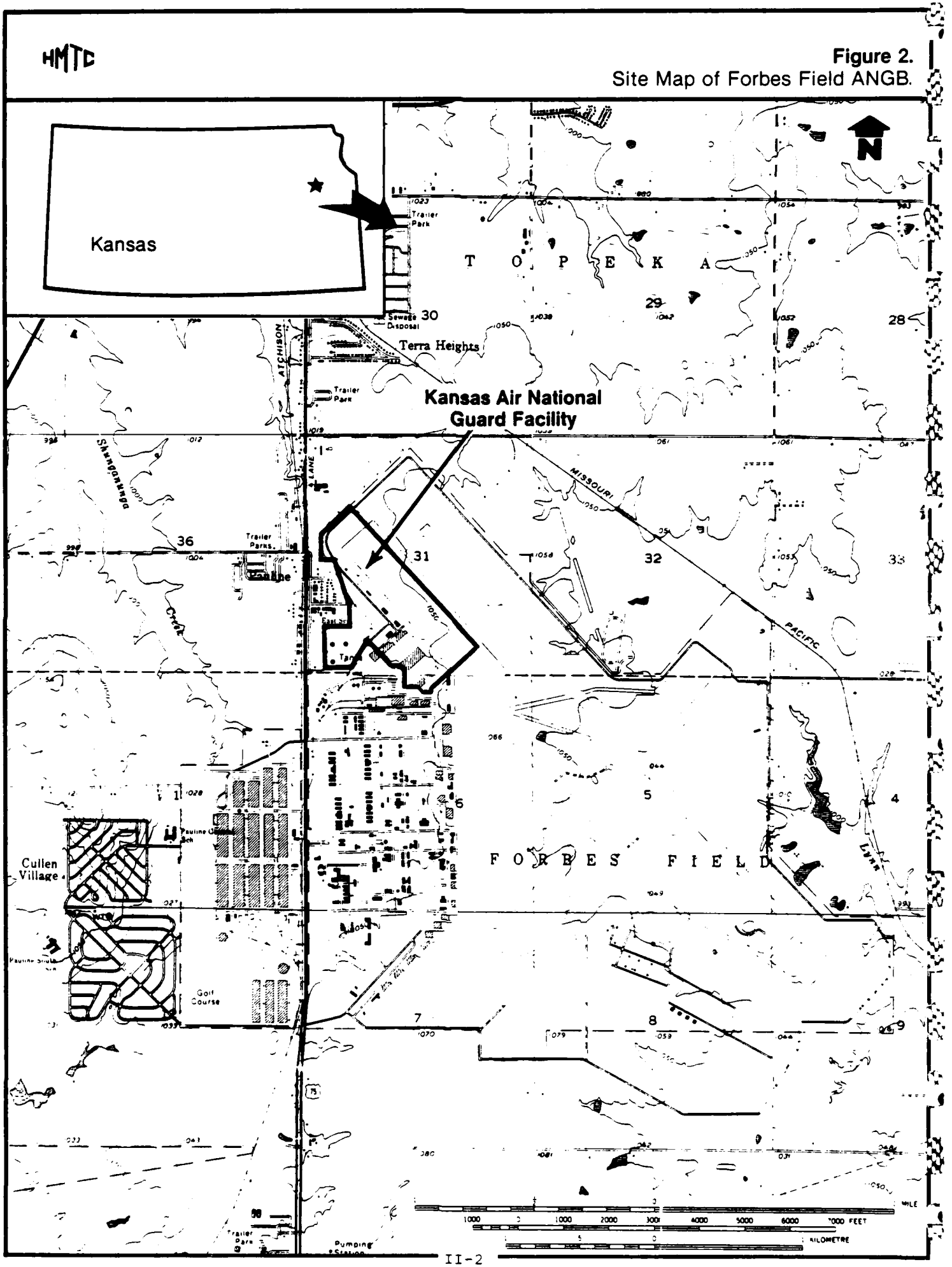
Figure 2.
Site Map of Forbes Field ANGB.



III. ENVIRONMENTAL SETTING

A. Meteorology

Topeka has an annual average of 33 inches of rainfall. By calculating net precipitation according to the method outlined in the Federal Register (47 FR 31224, July 16, 1982), a net precipitation value of negative 13 inches per year is obtained. Rainfall intensity based on 1-year, 24-hour rainfall is 2.75 inches (calculated according to 47 FR 31235, July 16, 1982, Figure 8).

B. Geology

Sedimentary rocks of Paleozoic age overlie the Precambrian basement complex in the area of Forbes Field. The sedimentary deposits are typically composed of shales, limestones, and thin sandstones, which record a distinctive cyclic pattern of sedimentation (Johnson and Adkison, 1967). Glacial drift deposited during the Kansan/Glaciation covers bedrock in some sections of the area. The drift is composed of clays, silts, and sands derived from local bedrock.

The entire area lies in the western part of the Forest City Basin. Outcropping rocks strike approximately N20E to N30E, and dip northwest at generally 20 to 40 feet per mile.

The geology of Forbes Field ANGB consists of interbedded marine shales and limestones of the Scranton Shale, Howard Limestone, and Severy Shale Formations. Glacial drift forms a thin veneer over the bedrock in some portions of the area. A thin layer (5-20 feet) of unconsolidated sediments composed of clays and silty clays is present above the bedrock formations. These deposits are apparently weathered from the underlying shales.

The soils at Forbes Field ANGB are represented by two soil series. The Ladysmith Series accounts for almost all the soils found at Forbes Field,

while the Pawnee Series accounts for a small area at the west-northwest corner of the base. Specifically, the three soil types found at Forbes Field are Ld; Ladysmith silty clay loam (0 to 1 percent slopes); Lm, Ladysmith silty clay loam (1 to 3 percent slopes); and Pc, Pawnee clay loam (3 to 7 percent slopes). Together, these soils form the Ladysmith-Pawnee association and are described as being deep, moderately well-drained, nearly level and gently sloping soils that have a silty clay or clay subsoil. This association is found in the uplands of Shawnee County. Permeability rates for these soils range from 3.53×10^{-5} cm/sec. to 4.44×10^{-4} cm/sec.

C. Hydrology

1. Surface Water

Forbes Field ANGB is not within the boundaries of a flood-plain associated with 100-year frequency floods. Local drainage is predominantly to the west-northwest to an unnamed tributary of Shungunuga Creek. Surface run-off and storm sewage are both contributors to the tributary. There is a small ponding area at the west-northwest corner of the base where the surface drainage collects prior to running into the tributary and offbase.

2. Groundwater

Groundwater is found within both the unconsolidated surficial deposits and the bedrock formations beneath Forbes Field. Within the unconsolidated sediments, water is found at shallow depths (4-12 feet) under unconfined conditions.

Water in the bedrock formations occurs predominantly in the limestone and sandstone beds and stringers interbedded within shales. Groundwater in these formations is present under confined conditions.

Groundwater flow horizontally across the base is generally from the west. The confined nature of groundwater within the bedrock formations creates an upward vertical gradient.

Water obtained from the formations involved in this study is of insufficient quantity to be used extensively for domestic water supplies. The base and the adjoining village of Pauline, Kansas, are both served by a public water supply system.

IV. FINDINGS

A. Activity Review

A review of base records and interviews with past and present base employees resulted in the identification of specific operations within each activity in which the majority of industrial chemicals are handled and hazardous wastes are generated. Table 1 summarizes the major operations associated with each activity, provides estimates of the quantities of waste currently being generated by these operations, and describes the past and present disposal routes for the wastes. If an operation is not listed in Table 1, then that operation has been determined on a best-estimate basis to produce negligible quantities of wastes requiring ultimate disposal. For example, where extremely small volumes of methyl ethyl ketone may be used on occasion, it commonly evaporates after use, and therefore it does not present a disposal problem in these instances. Conversely, if a particularly volatile compound is listed, then the quantity represents an estimate of the amount actually disposed of according to the method shown.

B. Disposal/Spill Site Identification, Evaluation, and Hazard Assessment

Interviews with eight base personnel (Appendix A) and subsequent site inspections resulted in the identification of 10 potentially contaminated disposal/spill sites at Forbes Field ANGB, Topeka, Kansas. It was determined that six of the 10 sites have the potential for contaminant migration (Step 4 of Figure 1), and will therefore be further evaluated and rated using HARM (Appendix B). Four of these six sites have already been evaluated in the Groundwater Contamination Study for Forbes Field, performed by Roy F. Weston, Inc. (WESTON). Subsequent to review of the study, it was decided that WESTON's analysis of the sites and recommendations for further contamination analysis were appropriate. Figure 3 illustrates the locations of the rated/unrated sites. Copies of the completed HARM rating forms are found in Appendix C. Table 2 summarizes the HARM scores for each of the rated sites.

Table 1. Shops that Generate Hazardous Waste/Used Hazardous Materials.

Shop Name	Bldg. No. (Past & Present)	Hazardous Waste/ Used Hazardous Material	Estimated Quantities (Gal./Year)	Method of Treatment/Storage/Disposal 1951	1970	1980	Present
Aircraft Maintenance	662, 665 666, 668	Paint Stripper	185		CONTRACT		DRMO
		Acetic Acid	12			NEUTR	
		Potassium Hydroxide	12			NEUTR	
		PD-680	500		CONTRACT		DRMO
		Carbon Remover	1			SAN SEWER	
		Penetrating Oil	35		CONTRACT		DRMO
		Sulfuric Acid	3			NEUTR	
		Zyglo Emulsifier	50		CONTRACT		DRMO
Aerospace Ground Equipment Maintenance	668	PD-680	55		CONTRACT		DRMO
Fuel Lab	677	JP-4	50		CONTRACT		DRMO
		Sulfuric Acid	3			NEUTR	
Vehicle Maintenance Motor Pool	770	Sulfuric Acid	3			NEUTR	

SAN SEWER - Drained to sanitary sewer
NEUTR - Neutralized and drained to sanitary sewer
CONTRACT - Disposed of by contractor
DRMO - Disposed of by Defense Reutilization and Marketing Office

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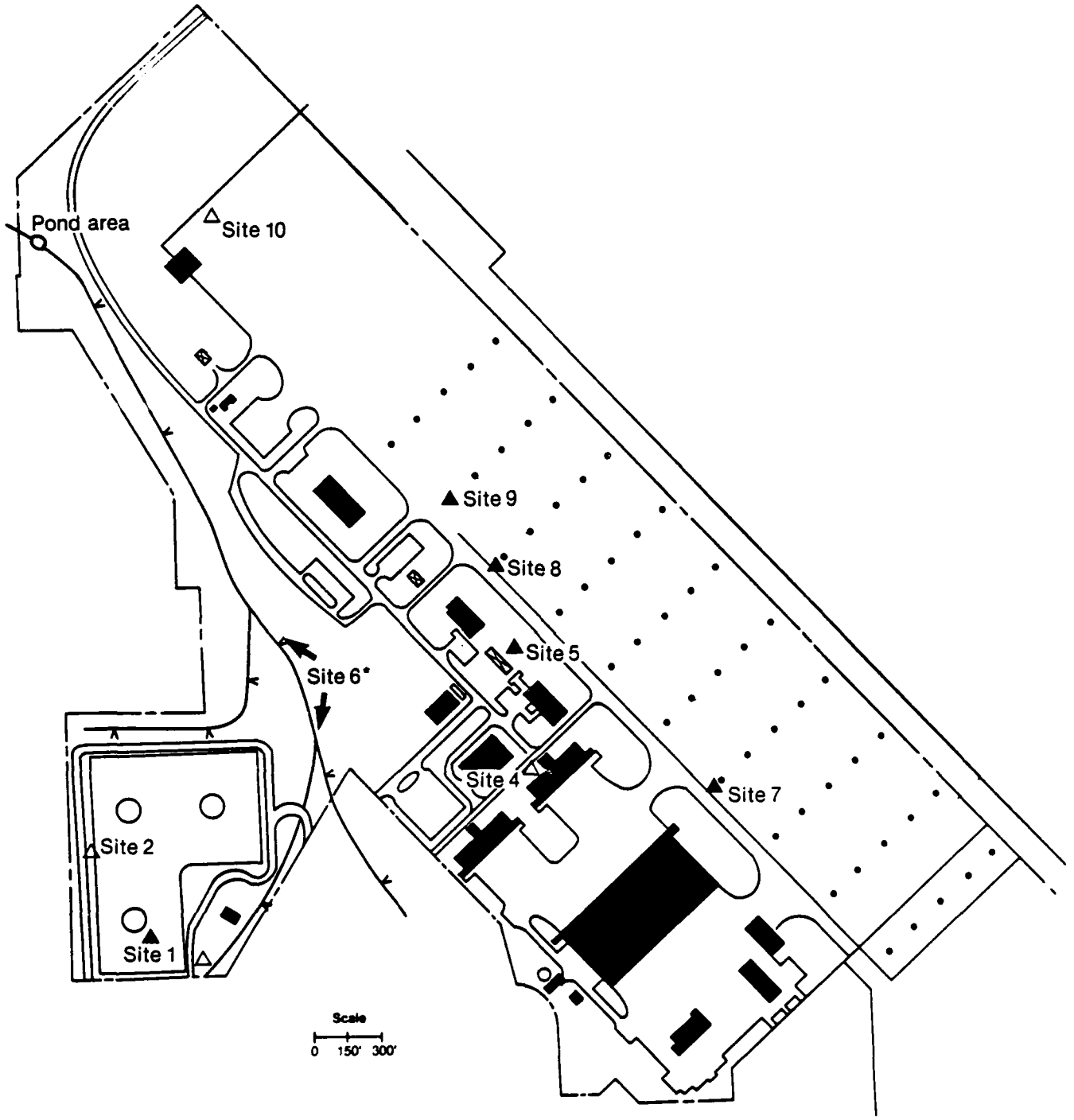
Figure 3.
Locations of Rated/Unrated Waste Disposal and Spill Sites at Forbes Field ANGB.



*Rated—Encompasses entire ditch and pond area at northwest corner of base.

Table 2. Summary of the Results of the Site HARM Ratings at Forbes Field ANGB

Site Priority	Site Number	Site Description	Subscores: Receptor	Waste Characteristics	Pathway	Waste Mgmt. Practices	Overall Score
1	7,8, & 9	Refueling hydrant laterals	16	80	100	1.0	65
2	5	Area adjacent to Pump-house Facility No. 671	16	80	80	1.0	59
3	6	Surface drainage ditch and storm sewer outflow	22	50	100	1.0	57
4	1	Area adjacent to Storage Facility No. 55122	19	60	48	1.0	40

Site No. 1 - Area Adjacent to JP-4 Storage Facility No. 55122 (HARM Score 40)

In the mid-summer of 1981, there was an estimated loss of 1,200 to 1,400 gallons of JP-4 at the aboveground bulk storage tank facility No. 55122. The leak occurred in an earthen-diked area on the southeast side of the tank. The fuel was foamed down by the fire department, and no product recovery was accomplished. It is estimated that what fuel did not evaporate was absorbed into the ground. The large volume of JP-4 spilled at this site with no subsequent recovery made it clear that a HARM rating was necessary at this site.

Site No. 2 - POL Sludge Burial Area (Unrated)

About 100 gallons of JP-4 tank cleaning sludge was buried on the west side of the JP-4 bulk storage area in 1977. Most of the sludge is said to have consisted of rusty water and soap. During the site inspection, the area of burial was visually defined by disturbed soil. Because of the small volume of sludge buried at this site, and the fact that most of it consisted of soap and water, it was decided that this site did not need HARM rating and further study.

Site No. 3 - Area Adjacent to NASA's JP-7 (jet fuel-thermally stable) Storage Facility No. 5704 (Unrated)

In 1982, there was a spill of about 300 gallons of JP-7 at NASA's aboveground fuel storage tank facility No. 57004. It is estimated that about 95 percent of this spill was recovered through absorption, and the rest was lost to ground absorption and evaporation. Because of the small amount of fuel that was lost to the environment (~ 15 gallons) and the fact that the loss occurred 4 years ago, it was decided that this site did not require HARM rating or further study.

Site No. 4 - Area Adjacent to Building No. 665 (Unrated)

In 1984, a 55-gallon drum of waste JP-4, PD680, and TURCO paint stripper leaked out on a paved area adjacent to Building No. 665. No recovery was made, and the waste fluids are assumed to be entirely lost to evaporation and ground absorption. The volume of spilled material was small, and no environmental receptors are near this site i.e., water wells, surface water bodies, etc. Several rated sites exist upgradient of this site, and these rated sites involve the loss of thousands of gallons of JP-4. Monitoring for the rated sites would most likely encompass any plume created by the loss of solvents at Site No. 4. In addition, the site is located over 500 feet from the nearest base boundary. For these reasons, it was decided not to HARM rate this site.

Site No. 5 - Area Adjacent to Pumphouse Facility No. 671 (HARM Score 59)

In 1967, there was a spill of JP-4 in the pumphouse facility No. 671. The fuel was let out of the confines of the pumphouse and spilled onto the ground outside, where vegetative stress is still observed. Estimated quantities of loss range from 2,000 to 10,000 gallons based on recall and rough calculations. It was also noted that construction excavation in the area uncovered visibly contaminated soil in 1979 or 1980. Because of the large volume of JP-4 lost at this site, the vegetative stress that is still evident, and the observance of contaminated soil several years ago, it was decided that HARM rating and further study should be accomplished at this site.

Site No. 6 - Surface Drainage Ditch and Storm Sewer Outflow (HARM Score 57)

Storm drainage flows offbase via a surface drainage ditch that runs along the west edge of the base. Just prior to leaving base property, the drainage collects in a small pond area at the northwest corner of the base. During the personnel interviews it was noted that an oily sheen has been observed in the ditch and the pond area on several occasions. It was

also noted that any large spills that might occur onbase, would be drained by this ditch, and that there is no mechanism for preventing the flow of water and contaminants offbase. In 1985, water samples were collected by the Base Bioenvironmental Engineering Technician. The samples were collected at the pond area, and were submitted to OEHL for analysis. Small amounts of oil and grease were detected as well as an elevated level of manganese. Results of the analyses can be found in Appendix D. Because of the water sampling data, the proximity of the ditch relative to the POL storage facility the occasional observation of an oily sheen on the water, and the fact that it drains the rest of the base property, the ditch was HARM rated and recommended for further study.

Sites Nos. 7, 8, and 9 - Refueling Hydrants Located on the Refueling Apron (HARM Score 65)

Sites No. 7, 8, and 9 are mentioned together because each site is where JP-4 fuel was lost at a refueling hydrant on the refueling apron. During the personnel interviews it became apparent that reliable estimates of the quantities of fuel involved in the spills were lacking. However, it is thought that the largest spill occurred in 1983, and involved the loss of up to 3,000 gallons of fuel. WESTON analyzed the refueling operations extensively, and also studied the storm sewer system which is where most of the spilled fuel went. Since the WESTON report confirmed the spills and subsequent contamination, it was decided HARM rating and further study were necessary for these sites. The sites are given one numerical rating due to their similarity with reference to the substances spilled, probable quantities of the spills, and their location relative to one another.

Site No. 10 - Fire Training Area (FTA) (Unrated)

The FTA consists of a new training pit that has been constructed on the northwest edge of the refueling apron on Forbes Field ANGB property. This pit, which is constructed of concrete and measures 25' x 25' x 8', is equipped with a floor drain and oil/water separator. Only five exercises

have been conducted in the new pit to date, each which involved the use of 25 to 30 gallons of JP-4 floating on water. Most of the residual fuel vaporizes or is caught and retained in the oil/water separator. No evidence suggests any loss of fuel to the environment (other than to the atmosphere) at the new FTA, so no HARM rating is necessary.

In summary, six of the ten identified sites have been HARM rated for the purposes of this Phase I study (Sites Nos. 1, 5, 6, 7, 8, and 9). The four remaining sites (Sites Nos. 2, 3, 4, and 10) are thought not to present contaminant migration problems, do not justify HARM scoring, require no further action, and should therefore be deleted from any future IRP studies.

C. Review of WESTON's Report

A review of WESTON indicates the confirmation of oil and grease contamination of soil and ground water at Forbes Field. The locations of the soil borings and monitoring wells used in the report are shown on Figures 4 and 5. WESTON's soil and water analysis results are given in Tables 3 and 4. Results of these analyses indicate confirmation of POL contamination in the vicinity of Site Nos. 5, 7, 8, and 9, as well as an area at the southeastern edge of base property. Since the southeastern boundary is located hydrogeologically upgradient of any suspected contaminant sources on base, it is estimated that the contaminants found here have migrated from a source or sources, located off base property.

The sampling and analysis performed by WESTON is not sufficient to fully characterize the extent, or the exact source of the contamination found onbase. The report also points out the fact that the numerous fuel hydrant laterals and storm sewer lines provide conduits for contaminant migration due to the high permeability characteristics of the backfill material. This adds to the difficulty of defining the contaminant plumes and their origin.

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Figure 4.
Forbes Field ANGB Soil Boring Locations.

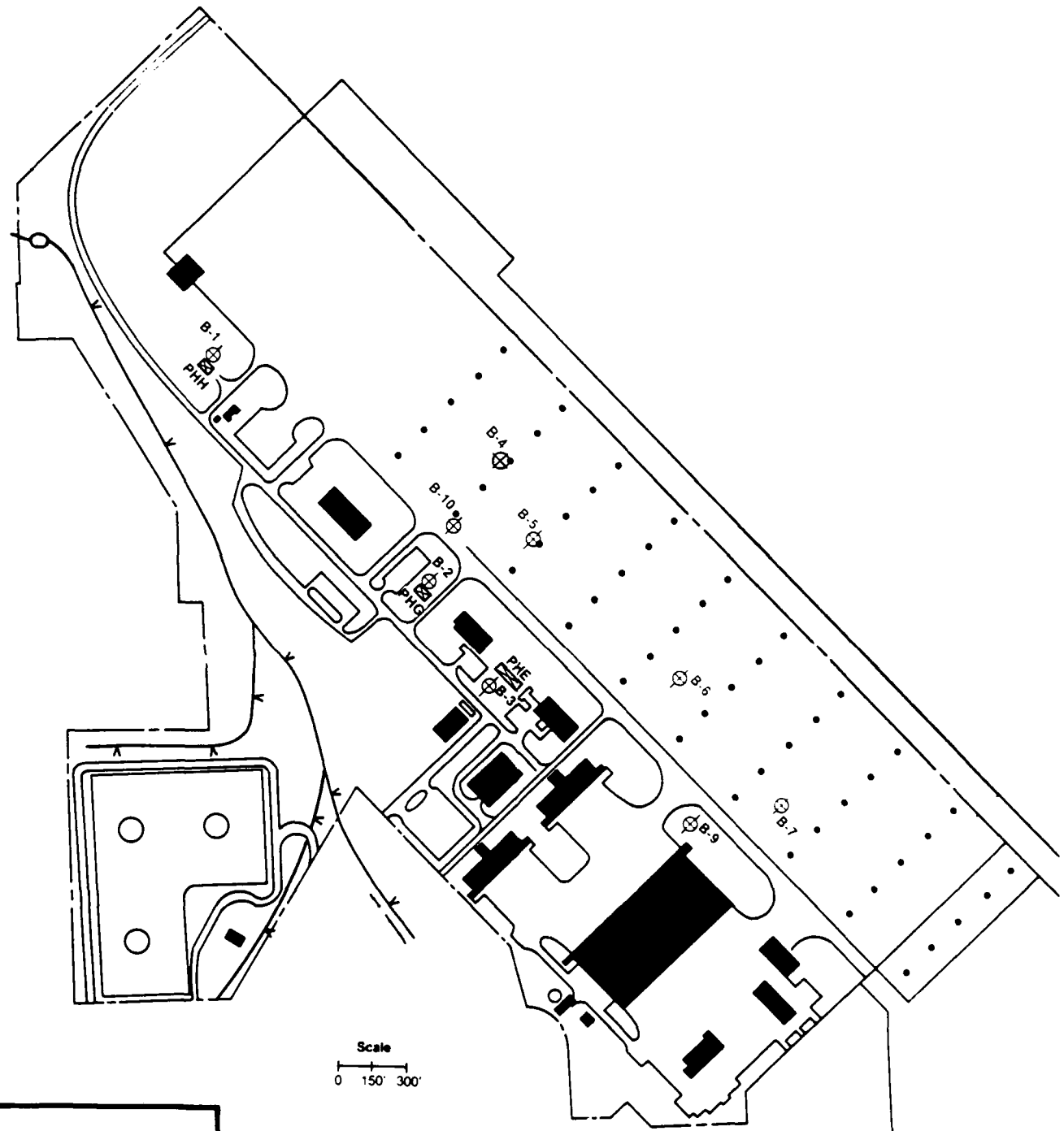

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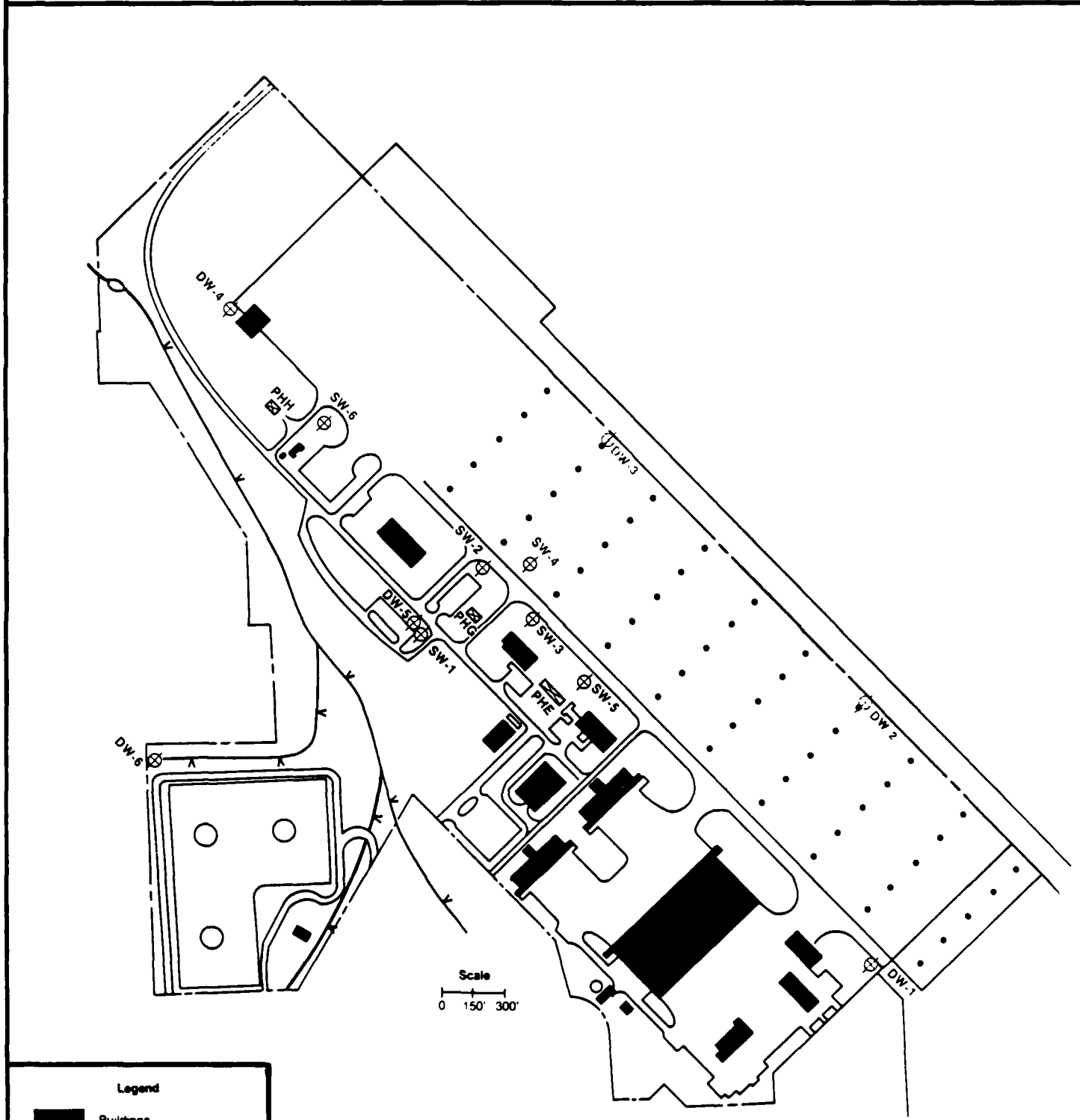
Figure 5.
Forbes Field ANGB Monitoring Well Locations.



Legend

- Buildings
- Jet Fuel Hydrants
- Jet Fuel Tanks
- Boundary of Property
- PHH Pumphouse
- Stream
- SW Shallow Monitoring Well
- DW Deep Monitoring Well

REVISED FROM WESTON'S REPORT (1985)

Table 3. Soil Sampling Analytical Results for Forbes Field ANGB

Boring Location	Sample Number	Depth (ft)	Field OVA Reading (ppm)	Room OVA Reading (ppm)	Field HNu Reading (ppm)	Room HNu Reading (ppm)	Oil and Grease Conc. (mg/kg)
B-2	S-3	8-13	0	7.2	0	5	51
B-3	S-2	5-8	65	4.2	0	0	50
B-4	S-1	1.7-6.7	55	4.2	0	11	36
B-9	S-3	8-12.7	0	6	0	5	25
B-10	S-1	1.4	10	100	4	300	686
SW-1	S-2	3.8	3	3.5	0	4	38
SW-3	S-4	13-16.5	0	7	0	2	38
SW-4	S-1	1.7-3.2	30	700	0	4	30
SW-4	S-3	8.2-11	100	7	0	4	31
SW-5	S-2	3-7.7	500	1000+	400	200	829

NOTE: Samples for B-2, B-9 and SW-3 exhibited positive OVA and HNu responses when the samples were later warmed to room temperature.

Table 4. Summary of Water Quality
Analytical Results for Forbes Field ANGB

Well	Oil and Grease (mg/l)
SW-1	1.09
SW-1 (Duplicate)	3.27
SW-2	1.75
SW-3	.23
SW-4	.45
SW-5	3970
SW-6	2.03
DW-1	.71
DW-2	<.10
DW-3	<.10
DW-4	<.10
DW-5	1.39
DW-6	.17
Detection Limit	.10
Taste and Odor Threshold	.01

WESTON's examination of geological and hydrological conditions present at Forbes Field indicate that the direction of shallow groundwater flow is generally similar to surface flow, to the west, toward the unnamed tributary of Shungunuga Creek that is located at the northwest edge of the base.

D. Critical Habitats/Endangered or Threatened Species

Discussions with personnel from the Kansas Department of Natural Resources disclosed that there are no indigenous endangered or threatened species of flora or fauna in the vicinity of Forbes Field ANGB. However, it was learned that a local zoo leases property adjacent to the south-southeast boundary of Forbes Field for breeding several exotic endangered species, including the Asian Wild Horse and the Reticulated Giraffe. This area is upgradient of the base and several miles distant, so it is not thought that the area is affected by past or present base operations.

There are no critical habitats, wetlands, or wilderness areas in the vicinity of Forbes Field ANGB.

V. CONCLUSIONS

- Information obtained through interviews with eight base personnel, review of base records, and field observations have resulted in the identification of 10 potentially contaminated disposal and/or spill sites at Forbes Field ANGB.

- Six of the 10 sites have been further evaluated using the Air Force's HARM. A priority list of these waste disposal and spill sites and their associated HARM scores has been presented in Table 2.

- No sites exhibit any major visible environmental stress.

- Evidence of soil contamination at the area adjacent to pumphouse Facility No. 671 (Site No. 5) was discovered prior to the Phase I study via visual observation during construction excavation.

- Confirmation of oil and grease contamination in the soil was made in the Weston report. The contamination was confirmed near the center of the base, and appears to be confirmed in the area of Sites Nos. 5, 7, 8, and 9.

- Concentrations of oil and grease in excess of the taste and odor threshold were found in nine of 12 groundwater monitoring wells sampled by WESTON. The three wells that exhibited levels of oil and grease below the detection limit are located hydrogeologically upgradient of the disposal/spill sites.

- The presence of oil and grease in WESTON's deep monitoring well DW-1, which is located upgradient of suspected source areas on the base, indicates the potential that contaminants are migrating onto the base from other areas.

- Contaminants migrating from base facilities in groundwater travel laterally toward the tributary to Shungunuga Creek that flows along the western boundaries of the base.

- Further site investigations will be required in order to fully characterize the contamination at Forbes Field ANGB.

- Any major POL spill that entered the storm drain system or surface drainage ditch would be difficult to contain, since there is no mechanism in place for stemming the flow of water offbase via the drainage ditch.

VI. RECOMMENDATIONS

There is potential for contaminant migration at Forbes Field ANGB; therefore, initial stages of the Phase II/IVA IRP are recommended. The purpose of Phase II/IVA effort is to fully characterize the extent of any soil and groundwater contamination.

WESTON has already confirmed POL contamination at Forbes Field, and has made recommendations for further sampling in order to characterize the contamination. The additional work recommended by WESTON is as follows:

1) An additional round of samples should be taken from existing wells DW-1 through DW-6 and SW-1 through SW-6 to verify the results obtained from the first sampling round. The parameters tested should be expanded to include U.S. EPA Priority Pollutant volatile organic compounds plus xylene.

2) Five additional groundwater monitoring wells should be constructed between Base facilities and the drainage way on the northwest side boundary. Four wells should be installed along the northwest boundary to determine if groundwater quality is being impacted at the downgradient edge of the property. Three of these wells should be completed in the unconsolidated deposits to monitor migration in the upper flow system. The remaining well should be a deep well located to monitor contaminant migration in the bedrock flow system. The fifth well should be installed at the northeast corner of the bulk fuel storage tank farm near the head of the surface water drainage ditch. Samples from these wells should be analyzed for the expanded parameter list.

3) Surface water samples should be collected from three locations in the drainage ditch on the northwest property boundary. One sample should be collected upstream of the bulk fuel storage area. The second sample should be collected mid-way between bulk fuel storage and the storm sewer outfall. The third sample should be collected from the area of the storm sewer outfall. Analysis of these samples should be for the expanded list of analyses.

4) At least one shallow monitoring well should be installed on the eastern edge of the site to monitor contamination possibly migrating on site from the east in the upper aquifer.

5) During collection of the next round of samples, the elevation of the stream bottom should be surveyed to determine whether the stream is recharging the groundwater system.

The Phase II/IV-A program should consist of an electromagnetic (terrain conductivity) geophysical survey to be performed prior to the sampling recommended by WESTON.

The use of a terrain conductivity meter will provide continuous data, by which a map showing relative contamination concentrations can be produced.

Prior to the survey, a surface grid should be surveyed on the base in order to provide coordinate points for the survey. The coordinate points will be used to establish locations of the conductivity readings relative to each other. A grid distance of 50 x 50 feet has proven effective in similar investigations. Also prior to the survey, base prints of underground tanks and pipes should be studied in order to compensate for abnormal data resulting from structural interferences.

Upon completion of the survey and analysis of the results, additional monitoring wells should be installed in order to confirm the results of the electromagnetic survey. By installing the wells on the basis of the findings of the electromagnetic survey, substantial savings in time and money can be realized by avoiding "hit and miss" installation of the wells. Soil and groundwater samples collected from the wells should be analyzed for the parameters specified in WESTON (oil and grease, and the U.S. EPA Priority Pollutant volatile organic compounds plus xylene).

In addition to the electromagnetic survey and subsequent placement of monitoring wells, it is recommended that sediment samples be collected from the drainage ditch and pond area (Site No. 6), and analyzed for the same parameters. These samples are in addition to the surface water samples recommended by WESTON to be taken in the ditch, and should be collected in the same locations as the surface water samples.

It is also recommended that a mechanism be installed in the surface drainage ditch near the base boundary, for the purpose of stemming drainage flow in the event that a large POL spill enters the ditch.

GLOSSARY OF TERMS

1. AQUIFER - A geologic formation, or group of formations, that contains sufficient saturated permeable material to conduct groundwater and to yield economically significant quantities of groundwater to wells and springs.

2. CONTAMINANT - As defined by Section 104(a)(2) of CERCLA, shall include, but not be limited to, any element, substance, compound, or mixture, including disease-causing agents, which after release into the environment and upon exposure, ingestion, inhalation, or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains, will cause or may reasonably be anticipated to cause death, disease, behavioral abnormalities, cancer, genetic mutation, or physical deformation in such organisms or their offspring.

3. CRITICAL HABITAT - An area necessary for the maintenance of a population of an endangered or threatened species.

4. DISCHARGE - The process involved in the draining or seepage of water out of a groundwater aquifer.

5. DOWNGRADIENT - A direction that is topographically or hydraulically downslope; the direction in which groundwater flows.

6. HARM - Hazard Assessment Rating Methodology - A system adopted and used by the United States Air Force to develop and maintain a priority listing of potentially contaminated sites on installations and facilities for remedial action based on potential hazard to public health, welfare, and environmental impacts. (Reference: DEQPPM 81-5, 11 December 1981).

7. HAZARDOUS WASTE - A solid or liquid waste that, because of its quantity, concentration, or physical, chemical, or infectious characteristics, may:

a. Cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible or incapacitating reversible illness; or

b. Pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed.

8. MIGRATION (Contaminant) - The movement of contaminants through pathways (groundwater, surface water, soil, and air).

9. PERMEABILITY - The capacity of a porous rock, sediment, or soil for transmitting a fluid without impairment of the structure of the medium; it is a measure of the relative ease of fluid flow under unequal pressure.

10. STRATA - Distinguishable horizontal layers separated vertically from other layers.

11. SURFACE WATER - All water exposed at the ground surface, including streams, rivers, ponds, and lakes.

12. UPGRADIENT - A direction that is topographically or hydraulically upslope.

13. WATER TABLE - The upper limit of the portion of the ground that is wholly saturated with water.

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Appendix A
Interviewee Information

INTERVIEWEE INFORMATION

Interviewee Number	Primary Duty Assignment	Years Associated With Forbes Field ANGB
1	Vehicle Maintenance	19
2	Bioenvironmental Engineering	2
3	Field Maintenance	18
4	Facilities Maintenance	19
5	Liquid Fuels Management	21
6	Civil Engineering	34
7	Fire Department	9
8	Civil Engineering	1

Appendix B
USAF Hazard Assessment Rating Methodology

USAF HAZARD ASSESSMENT RATING METHODOLOGY

The Department of Defense (DoD) has established a comprehensive program to identify, evaluate, and control problems associated with past disposal practices at DoD facilities. One of the actions required under this program is to:

> develop and maintain a priority listing of contaminated installations and facilities for remedial action based on potential hazard to public health, welfare, and environmental impacts. (Reference: DEQPPM 81-5, 11 December 1981).

Accordingly, the United States Air Force (USAF) has sought to establish a system to set priorities for taking further actions at sites based upon information gathered during the Records Search phase of its Installation Restoration Program (IRP).

PURPOSE

The purpose of the site rating model is to provide a relative ranking of sites of suspected contamination from hazardous substances. This model will assist the Air National Guard in setting priorities for follow-on site investigations.

This rating system is used only after it has been determined that (1) potential for contamination exists (hazardous wastes present in sufficient quantity), and (2) potential for migration exists. A site can be deleted from consideration for rating on either basis.

DESCRIPTION OF MODEL

Like the other hazardous waste site ranking models, the U.S. Air Force's site rating model uses a scoring system to rank sites for priority attention. However, in developing this model, the designers incorporated some special features to meet specific DoD program needs.

The model uses data readily obtained during the Records Search portion (Phase I) of the IRP. Scoring judgment and computations are easily made. In assessing the hazards at a given site, the model develops a score based on the most likely routes of contamination and the worst hazards at the site. Sites are given low scores only if there are clearly no hazards. This approach meshes well with the policy for evaluating and setting restrictions on excess DoD properties.

Site scores are developed using the appropriate ranking factors according to the method presented in the flow chart (Figure 1 of this report). The site rating form and the rating factor guideline are provided at the end of this appendix.

As with the previous model, this model considers four aspects of the hazard posed by a specific site: possible receptors of the contamination, the waste and its characteristics, the potential pathways for contamination migration, and any efforts that were made to contain the wastes resulting from a spill.

The receptors category rating is based on four rating factors: the potential for human exposure to the site, the potential for human ingestion of contaminants should underlying aquifers be polluted, the current and anticipated uses of the surrounding area, and the potential for adverse effects upon important biological resources and fragile natural settings. The potential for human exposure is evaluated on the basis of the total population within 1,000 feet of the site, and the distance between the site and the base boundary. The potential for human ingestion of contaminants is based on the distance between the site and the nearest well, the groundwater use of the uppermost aquifer, and population served by the groundwater supply within 3 miles of the site. The uses of the surrounding area are determined by the zoning within a 1-mile radius. Determination of whether or not critical environments exist within a 1-mile radius of the site predicts the potential for

adverse effects from the site upon important biological resources and fragile natural settings. Each rating factor is numerically evaluated (0-3) and increased by a multiplier. The maximum possible score is also computed. The factor score and maximum possible scores are totaled, and the receptors subscore computed as follows: receptors subscore = (100 x factor score subtotal/ maximum score subtotal).

The waste characteristics category is scored in three steps. First, a point rating is assigned based on an assessment of the waste quantity and the hazard (worst case) associated with the site. The level of confidence in the information is also factored into the assessment. Next, the score is multiplied by a waste persistence factor, which acts to reduce the score if the waste is not very persistent. Finally, the score is further modified by the physical state of the waste. Liquid wastes receive the maximum score, while scores for sludges and solids are reduced.

The pathways category rating is based on evidence of contaminant migration or an evaluation of the highest potential (worst case) for contaminant migration along one of three pathways: surface-water migration, flooding, and groundwater migration. If evidence of contaminant migration exists, the category is given a subscore of 80 to 100 points. For indirect evidence, 80 points are assigned, and for direct evidence, 100 points are assigned. If no evidence is found, the highest score among the three possible routes is used. The three pathways are evaluated and the highest score among all four of the potential scores is used.

The scores for each of the three categories are added together and normalized to a maximum possible score of 100. Then the waste management practice category is scored. Scores for sites with no containment are not reduced. Scores for sites with limited containment can be reduced by 5 percent. If a site is contained and well managed, its score can be reduced by 90 percent. The final site score is calculated by applying the waste management practices category factory to the sum of the scores for the other three categories.

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE _____

LOCATION _____

DATE OF OPERATION OR OCCURRENCE _____

OWNER/OPERATOR _____

COMMENTS/DESCRIPTION _____

SITE RATED BY _____

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site		4		
B. Distance to nearest well		10		
C. Land use/zoning within 1 mile radius		3		
D. Distance to installation boundary		6		
E. Critical environments within 1 mile radius of site		10		
F. Water quality of nearest surface water body		6		
G. Ground water use of uppermost aquifer		9		
H. Population served by surface water supply within 3 miles downstream of site		6		
I. Population served by ground-water supply within 3 miles of site		6		
		Subtotals	_____	_____

Receptors subscore (100 X factor score subtotal/maximum score subtotal) _____

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) _____
2. Confidence level (C = confirmed, S = suspected) _____
3. Hazard rating (H = high, M = medium, L = low) _____

Factor Subscore A (from 20 to 100 based on factor score matrix) _____

B. Apply persistance factor
Factor Subscore A X Persistance Factor = Subscore B

_____ X _____ = _____

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

_____ X _____ = _____

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore _____

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Distance to nearest surface water		8		
Net precipitation		6		
Surface erosion		8		
Surface permeability		6		
Rainfall intensity		8		
		Subtotals	_____	_____

Subscore (100 X factor score subtotal/maximum score subtotal) _____

2. Flooding

		1		

Subscore (100 X factor score/3) _____

3. Ground water migration

Depth to ground water		8		
Net precipitation		6		
Soil permeability		8		
Subsurface flows		8		
Direct access to ground water		8		
		Subtotals	_____	_____

Subscore (100 X factor score subtotal/maximum score subtotal) _____

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore _____

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors _____
Waste Characteristics _____
Pathways _____

Total _____ divided by 3 = _____

Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

_____ X _____ = _____

Table 1
HAZARDOUS ASSESSMENT RATING METHODOLOGY GUIDELINES

1. RECEPTORS CATEGORY

Rating Factors	Rating Scale Levels 0	1	2	3	Multiplier
A. Population within 1,000 feet (includes on-base facilities)	0	1-25	26-100	Greater than 100	4
B. Distance to nearest water well	Greater than 3 miles	1 to 3 miles	3,001 feet to 1 mile	0 to 3,000 feet	10
C. Land Use/Zoning (within 1-mile radius)	Completely remote (zoning not applicable)	Agricultural	Commercial or Industrial	Residential	3
D. Distance to installation boundary	Greater than 2 miles	1 to 2 miles	1,001 feet to 1 mile	0 to 1,000 feet	6
E. Critical environments (within 1-mile radius)	Not a critical environment	Natural areas	Pristine natural areas; minor wetlands; preserved areas; presence of economically important natural resources susceptible to contamination	Major habitat of an endangered or threatened species; presence of recharge area; major wetlands	10
F. Water quality/use designation of nearest surface water body	Agricultural or Industrial use	Recreation, propagation and management of fish and wildlife	Shellfish propagation and harvesting	Potable water supplies	6
G. Ground-water use of uppermost aquifer	Not used, other sources readily available	Commercial, industrial, or irrigation, very limited other water sources	Drinking water, municipal water available	Drinking water, no municipal water available; commercial, industrial, or irrigation, no other water source available	9
H. Population served by surface water supplies within 3 miles downstream of site	0	1-15	51-1,000	Greater than 1,000	6
I. Population served by aquifer supplies within 3 miles of site	0	1-50	51-1,000	Greater than 1,000	6

Table 1--Continued

II. WASTE CHARACTERISTICS

A-1 Hazardous Waste Quantity

S = Small quantity (5 tons or 20 drums of liquid)
M = Moderate quantity (5 to 20 tons or 21 to 85 drums of liquid)
L = Large quantity (20 tons or 85 drums of liquid)

A-2 Confidence Level of Information

C = Confirmed confidence level (minimum criteria below)

- o Verbal reports from interviewer (at least 2) or written information from the records
- o Knowledge of types and quantities of wastes generated by shops and other areas on base

S = Suspected confidence level

- o No verbal reports or conflicting verbal reports and no written information from the records
- o Logic based on a knowledge of the types and quantities of hazardous wastes generated at the base, and a history of past waste disposal practices indicate that these wastes were disposed of at a site

A-3 Hazard Rating

Rating Factors	Rating Scale Levels			
	0	1	2	3
Toxicity	Sax's Level 0	Sax's Level 1	Sax's Level 2	Sax's Level 3
Ignitability	Flash point greater than 200°F	Flash point at 140°F to 200°F	Flash point at 80°F to 140°F	Flash point less than 80°F
Radioactivity	At or below background levels	1 to 3 times background levels	3 to 5 times background levels	Over 5 times background levels

Use the highest individual rating based on toxicity, ignitability and radioactivity and determine the hazard rating.

Hazard Rating	Points
High (H)	3
Medium (M)	2
Low (L)	1

Table 1--Continued

11. WASTE CHARACTERISTICS--Continued

Waste Characteristics Matrix

Point Rating	Hazardous Waste Quantity	Confidence Level of Information	Hazard Rating
100	L	C	H
80	L	C	H
	M	C	H
70	L	S	H
60	S	C	H
	M	C	M
50	L	S	M
	L	C	L
	M	S	H
	S	C	M
40	S	S	M
	M	S	M
	M	C	L
	L	S	L
30	S	C	L
	M	S	L
	S	S	M
20	S	S	L

Notes:
For a site with more than one hazardous waste, the waste quantities may be added using the following rules:

Confidence Level
- Confirmed confidence levels (C) can be added.
- Suspected confidence levels (S) can be added.
- Confirmed confidence levels cannot be added with suspected confidence levels.

Waste Hazard Rating
- Wastes with the same hazard rating can be added.
- Wastes with different hazard ratings can only be added in a downgrade mode, e.g., MCH + SCH = LCH if the total quantity is greater than 20 tons.

Example: Several wastes may be present at a site, each having an MCH designation (60 points). By adding the quantities of each waste, the designation may change to LCH (80 points). In this case, the correct point rating for the waste is 80.

B. Persistence Multiplier for Point Rating

Persistence Criteria	Multiply Point Rating From Part A by the Following
Metals, polycyclic compounds, and halogenated hydrocarbons	1.0
Substituted and other ring compounds	0.9
Straight chain hydrocarbons	0.8
Easily biodegradable compounds	0.4

C. Physical State Multiplier

Physical State	Multiply Point Total From Parts A and B by the Following
Liquid	1.0
Sludge	0.75
Solid	0.50

Table 1--Continued

III. PATHWAYS CATEGORY

A. Evidence of Contamination

Direct evidence is obtained from laboratory analyses of hazardous contaminants present above natural background levels in surface wat ground water, or air. Evidence should confirm that the source of contamination is the site being evaluated.

Indirect evidence might be from visual observation (i.e., leachate), vegetation stress, sludge deposits, presence of taste and odors drinking water, or reported discharges that cannot be directly confirmed as resulting from the site, but the site is greatly suspected of being a source of contamination

B-1 Potential for Surface Water Contamination

Rating Factors	Rating Scale Levels 0	1	2	3	Multiplie
Distance to nearest surface water (includes drainage ditches and storm sewers)	Greater than 1 mile	2,001 feet to 1 mile	501 feet to 2,000 feet	0 to 500 feet	8
Net precipitation	Less than -10 inches	-10 to +5 inches	+5 to +20 inches	Greater than +20 inches	6
Surface erosion	None	Slight	Moderate	Severe	8
Surface permeability	0% to 15% clay ($>10^{-2}$ cm/sec)	15% to 30% clay (10^{-2} to 10^{-4} cm/sec)	30% to 50% clay (10^{-4} to 10^{-6} cm/sec)	Greater than 50% clay ($>10^{-6}$ cm/sec)	6
Rainfall intensity based on 1-year 24-hour rainfall (Thunderstorms)	<1.0 inch 0-5 0	1.0 to 2.0 inches 6-35 30	2.1 to 3.0 inches 36-49 60	>3.0 inches >50 100	8

B-2 Potential for Flooding

Floodplain	Beyond 100-year floodplain	In 100-year floodplain	In 10-year floodplain	Floods annually	1

B-3 Potential for Ground-Water Contamination

Depth to ground water	Greater than 500 feet	50 to 500 feet	11 to 50 feet	0 to 10 feet	8
Net precipitation	Less than -10 inches	-10 to +5 inches	+5 to + 20 inches	Greater than +20 inches	6
Soil permeability	Greater than 50% clay ($>10^{-6}$ cm/sec)	30% to 50% clay (10^{-4} to 10^{-6} cm/sec)	15% to 30% clay (10^{-2} to 10^{-4} cm/sec)	0% to 15% clay ($<10^{-2}$ cm/sec)	8

B-3 Potential for Ground-Water Contamination--Continued

Rating Factors	Rating Scale Levels 0	1	2	3	Multiplier
Subsurface flows	Bottom of site greater than 5 feet above high ground-water level	Bottom of site occasionally submerged	Bottom of site frequently submerged	Bottom of site located located below mean ground-water level	8
Direct access to ground water (through faults, fractures, faulty well casings, subsidence, fissures, etc.)	No evidence of risk	Low risk	Moderate risk	High risk	8

IV. WASTE MANAGEMENT PRACTICES CATEGORY

A. This category adjusts the total risk as determined from the receptors, pathways, and waste characteristics categories for waste management practices and engineering controls designed to reduce this risk. The total risk is determined by first averaging the receptors, pathways, and waste characteristics subscores.

B. Waste Management Practices Factor

The following multipliers are then applied to the total risk points (from A):

Waste Management Practice	Multiplier
No containment	1.0
Limited containment	0.95
Fully contained and in full compliance	0.10

Guidelines for fully contained:

Landfills:

- o Clay cap or other impermeable cover
- o Leachate collection system
- o Liners in good condition
- o Adequate monitoring wells

Surface Impoundments:

- o Liners in good condition
- o Sound dikes and adequate freeboard
- o Adequate monitoring wells

Spills:

- o Quick spill cleanup action taken
- o Contaminated soil removed
- o Soil and/or water samples confirm total cleanup of the spill

Fire Protection Training Areas:

- o Concrete surface and berms
- o Oil/water separator for pretreatment of runoff
- o Effluent from oil/water separator to treatment plant

General Note: If data are not available or known to be complete the factor ratings under items I-A through I, III-B-1, or III-6-3, then leave blank for calculation of factor score and maximum possible score.

CNR122

Appendix C
Site Harm Rating Forms

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE Site No. 1, Area adjacent to JP-4 Storage Facility No. 55122

LOCATION Southeast side of JP-4 storage tank No. 55122 - at fuel farm

DATE OF OPERATION OR OCCURRENCE Summer - 1981

OWNER/OPERATOR Forbes Field ANGB

COMMENTS/DESCRIPTION JP-4 spill onto ground - no recovery

SITE RATED BY HMTC

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	2	4	8	12
B. Distance to nearest well	0	10	0	30
C. Land use/zoning within 1 mile radius	3	1	9	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	0	6	0	18
G. Ground water use of uppermost aquifer	0	9	0	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	0	6	0	18
		Subtotals	35	180

Receptors subscore (100 X factor score subtotal/maximum score subtotal) 19

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) M
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard rating (H = high, M = medium, L = low) M

Factor Subscore A (from 20 to 100 based on factor score matrix) 60

B. Apply persistence factor
Factor Subscore A X Persistence Factor = Subscore B

60 X 1.0 = 60

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

60 X 1.0 = 60

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 0

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Distance to nearest surface water	3	8	24	24
Net precipitation	0	6	0	18
Surface erosion	0	8	0	24
Surface permeability	2	6	12	18
Rainfall intensity	2	8	16	24
		Subtotals	52	108

Subscore (100 X factor score subtotal/maximum score subtotal) 48

2. Flooding

Flooding	0	1	0	3

Subscore (100 X factor score/3) 0

3. Ground water migration

Depth to ground water	2	8	16	24
Net precipitation	0	6	0	18
Soil permeability	1	8	8	24
Subsurface flows	1	8	8	24
Direct access to ground water	0	8	0	24
		Subtotals	32	114

Subscore (100 X factor score subtotal/maximum score subtotal) 28

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 48

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	19
Waste Characteristics	60
Pathways	48
Total 127 divided by 3 =	42
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

42 x 0.95 = 40

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE Site No.5, Area Adjacent to Pumphouse Facility No. 671

LOCATION East side of building No. 671

DATE OF OPERATION OR OCCURRENCE 1967

OWNER/OPERATOR Forbes Field ANGB

COMMENTS/DESCRIPTION Large loss of JP-4- no recovery

SITE RATED BY HMTC

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	2	4	8	12
B. Distance to nearest well	0	10	0	30
C. Land use/zoning within 1 mile radius	3	3	9	9
D. Distance to installation boundary	2	6	12	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	0	6	0	18
G. Ground water use of uppermost aquifer	0	9	0	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	0	6	0	18
		Subtotals	29	180

Receptors subscore (100 X factor score subtotal/maximum score subtotal) 16

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) L
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard rating (H = high, M = medium, L = low) M

Factor Subscore A (from 20 to 100 based on factor score matrix) 80

B. Apply persistence factor
Factor Subscore A X Persistence Factor = Subscore B

80 x 1.0 = 80

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

80 x 1.0 = 80

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 80

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Distance to nearest surface water	2	8	16	24
Net precipitation	0	6	0	18
Surface erosion	0	8	0	24
Surface permeability	2	6	12	18
Rainfall intensity	2	8	16	24
		Subtotals	44	108

Subscore (100 X factor score subtotal/maximum score subtotal) 41

2. Flooding	0	1	0	3

Subscore (100 X factor score/3) 0

3. Ground water migration

Depth to ground water	2	8	16	24
Net precipitation	0	6	0	18
Soil permeability	1	8	8	24
Subsurface flows	1	8	8	24
Direct access to ground water	0	8	0	24
		Subtotals	32	114

Subscore (100 X factor score subtotal/maximum score subtotal) 28

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 30

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	16
Waste Characteristics	80
Pathways	30
Total 176 divided by 3 =	59
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

59 x 1.0 = 59

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE Site No. 6 Surface Drainage Ditch and Storm Sewer Outflow

LOCATION Along western side of base and flowing off the northwest corner

DATE OF OPERATION OR OCCURRENCE Throughout the life of the base

OWNER/OPERATOR Forbes Field ANGB

COMMENTS/DESCRIPTION This site encompasses the entire ditch and pond area

SITE RATED BY HMTC

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	3	4	12	12
B. Distance to nearest well	0	10	0	30
C. Land use/zoning within 1 mile radius	3	3	9	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	0	6	0	18
G. Ground water use of uppermost aquifer	0	9	0	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	0	6	0	18
		Subtotals	39	180

Receptors subscore (100 X factor score subtotal/maximum score subtotal) 22

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C - confirmed, S - suspected) C
3. Hazard rating (H - high, M - medium, L - low) M

Factor Subscore A (from 20 to 100 based on factor score matrix) 50

B. Apply persistence factor
Factor Subscore A X Persistence Factor = Subscore B

50 X 1.0 = 50

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

50 X 1.0 = 50

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 100

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Distance to nearest surface water		8		
Net precipitation		6		
Surface erosion		8		
Surface permeability		6		
Rainfall intensity		8		
		Subtotals	____	____

Subscore (100 X factor score subtotal/maximum score subtotal) ____

2. Flooding

Flooding		1		

Subscore (100 X factor score/3) ____

3. Ground water migration

Depth to ground water		8		
Net precipitation		6		
Soil permeability		8		
Subsurface flows		8		
Direct access to ground water		8		
		Subtotals	____	____

Subscore (100 X factor score subtotal/maximum score subtotal) ____

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 100

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	22
Waste Characteristics	50
Pathways	100
Total 172 divided by 3 =	57
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

57 x 1.0 = 57

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE Sites Nos. 7,8, and 9, Refueling Hydrant Laterals

LOCATION Along the southwest edge of the refueling apron

DATE OF OPERATION OR OCCURRENCE Uncertain - Several spills have occurred over the years

OWNER/OPERATOR Forbes Field ANGB

COMMENTS/DESCRIPTION These spills and subsequent contamination have been confirmed by WESTON

SITE RATED BY HMTC

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	2	4	8	12
B. Distance to nearest well	0	10	0	30
C. Land use/zoning within 1 mile radius	3	3	9	9
D. Distance to installation boundary	2	6	12	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	0	6	0	18
G. Ground water use of uppermost aquifer	0	9	0	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	0	6	0	18
		Subtotals	29	180

Receptors subscore (100 X factor score subtotal/maximum score subtotal) 16

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) L
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard rating (H = high, M = medium, L = low) M

Factor Subscore A (from 20 to 100 based on factor score matrix) 80

B. Apply persistence factor
Factor Subscore A X Persistence Factor = Subscore B

80 X 1.0 = 80

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

80 X 1.0 = 80

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 100

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Distance to nearest surface water		8		
Net precipitation		6		
Surface erosion		8		
Surface permeability		6		
Rainfall intensity		8		
		Subtotals	____	____

Subscore (100 X factor score subtotal/maximum score subtotal) ____

2. Flooding

		1		

Subscore (100 X factor score/3) ____

3. Ground water migration

Depth to ground water		8		
Net precipitation		6		
Soil permeability		8		
Subsurface flows		8		
Direct access to ground water		8		
		Subtotals	____	____

Subscore (100 X factor score subtotal/maximum score subtotal) ____

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 100

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	16
Waste Characteristics	80
Pathways	100

Total 196 divided by 3 = 65
Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

65 X 1.0 = 65

Appendix D
OEHL Test Results

ENVIRONMENTAL SAMPLING DATA

(Use this space for mechanical imprint)

OEHL ID (LAB USE ONLY)

SAMPLING SITE IDENTIFIER (AFR 19-7): 0265 NS 001

BASE WHERE SAMPLE COLLECTED: Forbes Field (ANG) KANSAS

SAMPLING SITE DESCRIPTION: FLIGHTLINE RUN-OFF DRAINAGE DITCH

DATE COLLECTION BEGAN (YYMMDD): 870212

TIME COLLECTION BEGAN (24 hour clock): 1430 HRS

COLLECTION METHOD: [X] GRAB [ ] COMPOSITE _____ HOURS

MAIL REPORTS TO (circle if changed): ORIGINAL 0265 / COPY 1 / COPY 2

190 CLINIC/SGPB FORBES FIELD (ANG) TOPEKA KS 66619-5536

SAMPLE COLLECTED BY (Name, Grade, AFSC): DURHAM, MICHAEL L. SRA 90750

SIGNATURE: Michael L Durham

AUTOVON: 720-4523

REASON FOR SUBMISSION: R

A-ACCIDENT/INCIDENT R-ROUTINE/PERIODIC C-COMPLAINT N-NPDES F-FOLLOWUP/CLEANUP O-OTHER (specify)

BASE SAMPLE NUMBER: GN 85 0009

OEHL PID

ANALYSES REQUESTED (check appropriate blocks)

GROUP A		GROUP D		GROUP E		GROUP F	
Ammonia	00610	Cyanide, Total	00720	Phenols	32730	Antimony	01097
Chemical Oxygen Demand	00340	Cyanide, Free	00722			Arsenic	01002
Kjeldahl Nitrogen	00625			GROUP G		Barium	01007
Nitrate	00620			Acidity, Total	70508	Beryllium	01012
Nitrite	00615			Alkalinity, Total	00410	Boron	
[X] Oil & Grease	00560			Alkalinity, Bicarbonate	00425	Cadmium	
Organic Carbon	00680			Bromide	71870	Calcium	
Orthophosphate	00671			Carbon Dioxide	00405	Chromium, Total	
Phosphorus, Total	00665			Chloride	00940	Chromium VI	
				Color	00080	Copper	
				Fluoride	00951		
				Iodide	71865		
				Odor	00086		
				Residue, Total	00500		
				Residue, Filterable (TDS)	70300		
				Residue, Nonfilterable	00530		

Hardness	00900	Residue, Settleable	50086
Iron	01045	Residue, Volatile	00505
Lead	01051	Silica	00955
Magnesium	00927	Specific Conductance	00095
Manganese	01055	Sulfate	00945
Mercury	71900	Sulfite	00740
Nickel	01067	Surfactants -MBAS	38260
Potassium	00937	Turbidity	00076
Selenium	01147		
Silver	01077		
Sodium	00929		
Thallium	01059		
Zinc	01092		

GROUP H		GROUP J	
BHC Isomers	39340	Sulfides	00745
Chlordane	39350		
DDT Isomers	39370		
Dieldrin	39380		
Endrin	39390		
Heptachlor	39410		
Heptachlor Epoxide	39420		
Lindane	39782		
Methoxychlor	39480		
Toxaphene	39400		
2,4-D	39730		
2,4,5-TP-Silvex	39760		
2,4,5-T	39740		

GROUP T	
Bromoform	32104
Bromodichloromethane	32101
Carbon Tetrachloride	32102
Chloroform	32106
Chloromethane	34418
Dibromochloromethane	32105
Methylene Chloride	34423
Tetrachloroethylene	34475
1,1,1-Trichloroethane	34506
Trichloroethylene	39180
Trihalomethanes	82080
PCBs	39516

ON SITE ANALYSES

Parameter		Value
Flow	50050	NFS mgd
Chlorine, Total	50060	— mg/l
Dissolved Oxygen	00300	— mg/l
pH	00400	<2 units
Temperature	00010	21 °C

COMMENTS:

(GN QC

WATER WELL

AF FORM

2. LABORATORY PERFORMING ANALYSIS	3. LAB SAMPLE NUMBER	4. REQUESTOR SAMPLE NO
O EHL	640447 00008	GN850009 00029

SAMPLE COLLECTION INFORMATION	5. DATE RECEIVED BY LAB	6. DATE ANALYSIS COMPLETED
7. SITE DESCRIPTION	10 SEPT, 85	27 SEPT, 85

8. SITE LOCATION NO	9. FLOWRATE AT SITE 00058 GAL/MIN	10. WEATHER 00041	ON-SITE ANALYTICAL RESULTS 16. WATER TEMP 00010 °C	17. PH 00400 UNITS	18. DISS O2 00300 MG/L
SEP	0 19 11				

11. COLLECTION DATE/PERIOD	12. COLLECTOR'S NAME	19. RESULTS OF OTHER ON-SITE ANALYSES
13. SAMPLING TECHNIQUE	14. PHONE NUMBER	
15. REASON FOR SAMPLE SUBMISSION		
NPDES a		

ANALYSES REQUESTED AND RESULTS

PRESERVATION GROUP A

PARAMETER	TOTAL	MG/L
Chemical Oxygen Demand	00340	
Total Organic CARBON as C	00680	

PRESERVATION GROUP B

PARAMETER	TOTAL	MG/L
OIL & GREASE FREON-IR Method	00560	1.3

PRESERVATION GROUP C

PARAMETER	TOTAL	MG/L
AMMONIA as N	00610	
NITRATE as N Cd Reduct. Method	00620	
NITRITE as N	00615	
TOTAL KJELDAHL NITROGEN as N	00625	
PHOSPHORUS Ortho PO4 as P	70507	
PHOSPHORUS as P	00665	

PRESERVATION GROUP D

PARAMETER	TOTAL	MG/L
CYANIDE	00720	
CYANIDE Free, Amenable to Cl_2	00722	

PRESERVATION GROUP E

PARAMETER	TOTAL	µG/L
PHENOLS	32730	

PRESERVATION GROUP F

PARAMETER	DISS	TOTAL	µG/L
ARSENIC	01000	01002	
BARIUM	01005	01007	
CADMIUM	01025	01027	
CHROMIUM	01030	01034	
CHROMIUM Hexavalent		01032	
COPPER	01040	01042	
IRON	01046	01045	
LEAD	01049	01051	
MANGANESE	01056	01055	
MERCURY	71890	71900	
NICKEL	01065	01067	
SELENIUM	01145	01147	
SILVER	01075	01077	
ZINC	01090	01092	
CALCIUM as Ca	00915	00916	mg/l
MAGNESIUM as Mg	00925	00927	mg/l
POTASSIUM	00935	00937	mg/l
SODIUM	00930	00929	mg/l

PRESERVATION GROUP G

PARAMETER	TOTAL	MG/L
BORON	01022	µg/l
BORON, Dissolved	01020	µg/l
CHLORIDE	00940	
COLOR	00080	Units
FLUORIDE	00951	
Residue Filterable (TDS)	00515	
Residue Non Filt (SS)	00530	
Residue	00500	
Residue Volatile	00505	
Specific Conductance	00095	µmhos
SULFATE as SO_4	00945	
SURFACTANTS MBAS as LAS	38260	
TURBIDITY	00076	Units

PRESERVATION GROUP J

PARAMETER		

1. ORGANIZATION REQUESTING ANALYSIS	CHEMIST	REVIEWED BY	APPROVED BY
19 /SEPB Field (2nG)			

ENVIRONMENTAL SAMPLING DATA

OEHL USE ONLY

(Use this space for mechanical imprint)

SAMPLING SITE IDENTIFIER (AFR 19-7): 026SNS001

BASE WHERE SAMPLE COLLECTED: FORBES Field (ANG) Topeka KS.

SAMPLING SITE DESCRIPTION: FLIGHTLINE

DATE COLLECTION BEGAN (YYMMDD): 12 01 21

TIME COLLECTION (24 hour clock): 1430 HRS

COLLECTION METHOD: [X] GRAB [ ] COMPOSITE ____ HOURS ____

MAIL REPORTS TO (circle if changed)
ORIGINAL: 0118 190 CLINIC/SGPB FORBES Field (ANG) TOPEKA, KS 66619-5300
COPY 1:
COPY 2:

SAMPLE COLLECTED BY (Name, Grade, AFSC): DURHAM, MICHAEL L. SRA 90750

SIGNATURE: Michael L. Durham

AUTOVON: 720-4523

REASON FOR SUBMISSION: R

A-ACCIDENT/INCIDENT R-ROUTINE/PERIODIC C-COMPLAINT N-NPDES F-FOLLOWUP/CLEANUP O-OTHER (specify)

BASE SAMPLE NUMBER: GN8S0009

OEHL PID:

ANALYSES REQUESTED (check appropriate blocks)

GROUP A		GROUP D		GROUP E		GROUP F		GROUP G		GROUP H		GROUP J	
Ammonia	00610	Cyanide, Total	00720	Phenols	32730	Antimony	01097	Acidity, Total	70508	BHC Isomers	39340	Sulfides	00745
Chemical Oxygen Demand	00340	Cyanide, Free	00722			Arsenic	01002	Alkalinity, Total	00410	Chlordane	39350		
Kjeldahl Nitrogen	00625					Barium	01007	Alkalinity, Bicarbonate	00425	DDT Isomers	39370		
Nitrate	00620					Beryllium	01012	Bromide	71870	Dieldrin	39380		
Nitrite	00615					Boron	01022	Carbon Dioxide	00405	Endrin	39390		
Oil & Grease	00560					Cadmium	01027	Chloride	00940	Heptachlor	39410		
Organic Carbon	00680					Calcium	01016	Color	00080	Heptachlor Epoxide	39420		
Orthophosphate	00671					Chromium, Total	01034	Fluoride	00951	Lindane	39782		
Phosphorus, Total	00665					Chromium VI	01032	Iodide	71865	Methoxychlor	39480		
						Copper		Odor	00086	Toxaphene	39400		
								Residue, Total	00500	2,4-D	39730		
								Residue, Filterable (TFR)	70300	2,4,5-TP-Silvex	39760		
								Residue, Nonfilterable	00530	2,4,5-T	39740		

GROUP T	
Bromoform	32104
Bromodichloromethane	32101
Carbon Tetrachloride	32102
Chloroform	32106
Chloromethane	34418
Dibromochloromethane	32105
Methylene Chloride	34423
Tetrachloroethylene	34475
1,1,1-Trichloroethane	34506
Trichloroethylene	39180
Trihalomethanes	82080
PCBs	39516

GROUP T	
Residue, Settleable	50086
Residue, Volatile	00505
Silica	00955
Specific Conductance	00095
Sulfate	00945
Sulfite	00740
Surfactants -MBAS	38260
Turbidity	00076

X HEAVY METALS

ON SITE ANALYSES

Parameter		Value
Flow	50050	1.05 mgd
Chlorine, Total	50060	— mg/l
Dissolved Oxygen	00300	— mg/l
pH	00400	<2 units
Temperature	00010	21 °C

COMMENTS

AF

15.4

2. LABORATORY PERFORMING ANALYSIS	3. LAB SAMPLE NUMBER	4. REQUESTOR SAMPLE NO
OEHL	64045 00008	GN850010 00029

SAMPLE COLLECTION INFORMATION	5. DATE RECEIVED BY LAB	6. DATE ANALYSIS COMPLETED
7. SITE DESCRIPTION	10 Sept, 85	27 Sept, 85

8. SITE LOCATION NO	9. FLOWRATE AT SITE 00061	10. WEATHER 00041	ON-SITE ANALYTICAL RESULTS 16. WATER TEMP 00010 °C	17. PH 00400 UNITS	18. DISS O2 00300 MG/L
	SEP 10 1961 loc0sa GAL/MIN				

11. COLLECTION DATE/PERIOD	12. COLLECTOR'S NAME	19. RESULTS OF OTHER ON-SITE ANALYSES

13. SAMPLING TECHNIQUE	14. PHONE NUMBER

15. REASON FOR SAMPLE SUBMISSION

NPDES a

ANALYSES REQUESTED AND RESULTS

43

PRESERVATION GROUP A

PARAMETER	TOTAL	MG/L
Chemical Oxygen Demand	00340	
Total Organic CARBON as C	00680	

PRESERVATION GROUP B

PARAMETER	TOTAL	MG/L
OIL & GREASE FREON-IR Method	00560	

PRESERVATION GROUP C

PARAMETER	TOTAL	MG/L
AMMONIA as N	00610	
NITRATE as N Cd Reduct. Method	00620	
NITRITE as N	00615	
TOTAL KJELDAHL NITROGEN as N	00625	
PHOSPHORUS Ortho PO4 as P	70507	
PHOSPHORUS as P	00665	

PRESERVATION GROUP D

PARAMETER	TOTAL	MG/L
CYANIDE	00720	
CYANIDE Free, Amenable to Cl_2	00722	

PRESERVATION GROUP E

PARAMETER	TOTAL	MG/L
PHENOLS	32730	

PRESERVATION GROUP F (230) µg/L

PARAMETER	DISS	TOTAL	
ARSENIC	01000	01002	
BARIUM	01005	01007	
CADMIUM	01025	(01027)	< 10
CHROMIUM	01030	(01034)	< 50
CHROMIUM Hexavalent		01032	
COPPER	01040	01042	
IRON	01046	01045	
LEAD	01049	(01051)	< 20
MANGANESE	01056	(01055)	406
MERCURY	71890	(71900)	< 1
NICKEL	01065	(01067)	< 50
SELENIUM	01145	01147	
SILVER	01075	(01077)	< 10
ZINC	01090	(01092)	< 50
CALCIUM as Ca	00915	00916	mg/l
MAGNESIUM as Mg	00925	00927	mg/l
POTASSIUM	00935	00937	mg/l
SODIUM	00930	00929	mg/l

PRESERVATION GROUP G

PARAMETER	TOTAL	MG/L
BORON	01022	µg/l
BORON, Dissolved	01020	µg/l
CHLORIDE	00940	
COLOR	00080	Units
FLUORIDE	00951	
Residue Filterable (TDS)	00515	
Residue Non Filt (SS)	00530	
Residue	00500	
Residue Volatile	00505	
Specific Conductance	00095	µmhoe
SULFATE as SO_4	00945	
SURFACTANTS MBAS as LAS	38260	
TURBIDITY	00076	Units

PRESERVATION GROUP J

PARAMETER		

21. ORGANIZATION REQUESTING ANALYSIS

CHEMIST

SIGNED BY

APPROVED BY

Appendix E
Resumes of Search Team Members

TIMOTHY N. GARDNER

Environmental Scientist

EDUCATION

M.A., Environmental Biology, Hood College
B.S., Forestry/Resource Management, West Virginia University

EXPERIENCE

Mr. Gardner has five years of technical experience in environmental control and research, with emphasis on risk assessment, chemical safety, radiation safety, hazardous waste management (chemical and radiologic), and activated carbon filtration research. His past responsibilities include site risk assessment, chemical and radioactive waste pickup and storage for disposal at a large cancer research facility, and chemical and radioactive spill control, as well as safety surveys and technical assistance in activated carbon desorption research.

EMPLOYMENT

Dynamac Corporation (1984-Present): Staff Scientist

At Dynamac, Mr. Gardner's responsibilities include site surveys and records searches for the Phase I portion of the Installation Restoration Program (IRP) for various Air National Guard Bases. Efforts include risk assessment, site prioritization, and remedial action recommendations. He has also been a contributing author for a closure-post closure plan for a hazardous waste landfill at Clovis AFB, plans and specifications for the removal of asbestos at several Air Force White Alice sites in Alaska, and the update and revision of a DLA regulation for "Disposal of Unwanted Radioactive Material."

NCI-Frederick Cancer Research Facility (1981-1984): Lab Technician

Mr. Gardner worked in radiation and chemical safety as well as environmental research. His responsibilities included monitoring personal and environmental air quality at work areas where free iodinations occurred, monitoring work areas and equipment for isotope contamination, periodic surveys to monitor compliance with NRC safety regulations, isotope inventory control, transfer of isotopes between licenses, and periodic calibration and maintenance of survey instruments. He was also responsible for radioactive and chemical waste pickup and storage for disposal, and served as an advisor for safety-related matters pertinent to radiation and radioactive waste, chemical safety, and industrial hygiene. In the environmental research division, he was involved in activated carbon desorption studies involving the use of analytic laboratory equipment.

PROFESSIONAL AFFILIATIONS

American Tree Farm Association
Hardwood Research Council
West Virginia Forestry Association

ROBERT J. PAQUETTE

EDUCATION

B.S., environmental science, University of New Hampshire, 1973

EXPERIENCE

Extensive experience in hazardous waste receiving, handling, storage, and property accounting. Designed a system of labeling hazardous material/waste for proper storage. Developed Part B Application Information for many hazardous waste facilities. Conducted training sessions in hazardous materials/waste including receiving/warehousing, storage compatibility and personal safety. Performed atmospheric sampling for all major pollutants, computer modeling research projects and surveillance of possible regional air pollution sources.

EMPLOYMENT

Dynamac Corporation (1984-present): Environmental Scientist

Presently working on Installation Restoration Program for Air National Guard. Also, wrote State-of-the-Art Procedures for Defense Supply Depots concerning compatibility, Packing, Packaging, Spill Response, and Recoupment of hazardous materials and waste.

Defense Reutilization and Marketing Region, Defense Depot Ogden (1981-1984): Environmental Protection Specialist

Provided daily property disposal guidance to DPDOs concerning receiving, handling, storage and property accounting of HM/HW; provided technical advice on the handling and disposal of HM/HW to field personnel at DPDOs in region. Interpreted State and Federal regulations for superiors and the DPDOs, and acted as liaison between field personnel and State/Federal environmentalists. Assisted in rewriting DOD environmental regulations. Trained DPDO personnel in all aspects of HM/HW procedures as part of their increasingly involved environmental mission; wrote Emergency Response and Spill Contingency Plans. Developed Part B applications for HW facilities. Conducted environmental audits at DPDOs and other D.O.D. facilities.

State of New Hampshire, Bureau of Solid Waste Management (1979-1981): Environmental Specialist

Responsible for all work activities dealing with uncontrolled hazardous waste sites. Working knowledge of safety equipment, personal protection equipment, safety plans, and monitoring, sampling and analytical procedures relating to hazardous waste. Daily contact with industry and the general public discussing current New Hampshire and Federal hazardous waste regulations. Assisted in developing regulations and interpreting existing regulations. Conducted research regarding proper disposal of hazardous waste materials; determining if certain materials are considered hazardous. Conducted inspections of industry to insure compliance with the Federal hazardous waste regulations (RCRA). Daily interaction with the U.S. Environmental Protection Agency.

State of New Hampshire, Air Resource Agency (1978-1979): Environmental Specialist

Assisted in conducting the research for and the development of the State Implementation Plan for New Hampshire; conducted computer modeling research projects and was partly responsible for Atmospheric Dispersion Modeling of Meteorology for the State of New Hampshire which included written and verbal reports. Knowledge of N.E.S.H.A.P. and N.H. Air Resource Regulations.

State of New Hampshire, Air Resource Agency (1974-1978): Air Pollution Technician

Responsible for atmospheric sampling for all major pollutants; site determination and development maintenance of air pollution monitors; air pollution monitoring and meteorology; chart data reduction; written reports; surveillance of all possible air pollution sources in district; inspections of most industries in district; constant public contact with county and city officials as well as the general populace; complaint investigations; occasional dissertations to private and public organizations.

MARK D. JOHNSON

EDUCATION

B.S., geology, James Madison University

EXPERIENCE

Five years' technical experience including geologic mapping, subsurface investigations, foundation inspections, groundwater monitoring, pumping and observation well installation, geotechnical instrumentation, groundwater assessment, preparation of Air Force Installation Restoration Program Guidance and preparation of statements of work for the Air Force.

EMPLOYMENT

Dynamac Corporation (1984-present): Geologist

Primarily responsible for preparing statements of work for Phase IV-A of the Air Force's Installation Restoration Program and assessing groundwater of hazardous waste disposal/spill sites on military installations for the purpose of determining rates and extents of contaminant migration and for identifying remedial actions. Prepared guidance document for the Air Force's Phase IV of the Installation Restoration Program.

Bechtel Associates Professional Corporation (1981-1984): Geologist

Performed the following duties in conjunction with major civil engineering projects including subways, nuclear power plants and buildings: prepared geologic maps of surface and subsurface facilities in rock and soil including tunnels, foundations and vaults; assessed groundwater conditions in connection with construction activities and groundwater control systems; monitored the installation of permanent and temporary dewatering systems and observation wells; monitored surface and subsurface settlement of tunnels; and participated in subsurface investigations.

Schnabel Engineering Associates (1981): Geologist

Inspected foundations and backfill placement.

AFFILIATIONS

Association of Engineering Geologists
British Tunneling Society

PUBLICATIONS

Eaton, W.D., and M.D. Johnson. "Navy Assessment and Control of Installation Pollutants Confirmation Study for sites 1,3,5, and 9 at the Naval Weapons Support Center, Crane, Indiana." November 1984.

Peters, G.O., Jr., and M.D. Johnson. "Installation Restoration Program Phase IV Management Guidance." March 1985.

Telesca, D.R., and M.D. Johnson. "Statement of Work for Phase IV-A-Remedial Action Plan Installation Restoration Program, MacDill Air Force Base, Hillsborough County, Florida." March 1985.

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